

CA-104

User's Manual

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Moxa Technologies Co., Ltd.

Tel: +886-2-89191230 Fax: +886-2-89191231

www.moxa.com

support@moxa.com.tw (worldwide)

support@moxa.com (The Americas)

CA-104

User's Manual

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Introduction

Welcome to MOXA CA-104 Series of advanced 4-port RS-232 PC/104 communication modules, a new industrial multiport serial board solution. With its PC/104 standard, CA-104 is compatible with any PC/104 CPU module or CPU card that accepts PC/104 expansion modules.

The following topics are covered in this chapter:

- ❑ **Overview**
- ❑ **Package Checklist**
- ❑ **Product Features**
- ❑ **Product Specifications**

Overview

CA-104 is a PC/104 module that supports the RS-232 serial interface, and can be used with PC/104 CPU modules or CPU cards that accept PC/104 expansion modules. CA-104 has 4 RS-232 ports accessed through RJ-45 connectors. You can configure the I/O Base Address and INT Vector of each port by two 7-switch DIP switch panels. The module's industry-standard MOXA UART (16C550 compatible) is fully programmable. The built-in 16 KV ESD surge protection protects other devices connected to the RS-232 network.

Package Checklist

MOXA CA-104 products are shipped with the following items:

- 1 MOXA CA-104 4-port serial board
- CA-104 Document & Software CD
- CA-104 Quick Installation Guide

NOTE: *Notify your sales representative if any of the above items is missing or damaged.*

Product Features

CA-104 products enjoy the following features:

- 4 RS-232 ports
- Tx/Rx LEDs for each port
- High speed data transmission—up to 230.4 Kbps
- DIP Switches for I/O Base address and Interrupt Vector
- IRQ settings are selectable by jumper
- Built-in 16 KV ESD surge protection for each serial port
- 64-byte FIFOs
- 8 LED indicators on board (red for Tx, and green for Rx)

Product Specifications

CA-104's specifications:

- Dimensions: 9.6 cm × 9.0 cm
- Bus: PC/104
- Baud rate: 50 to 230.4 Kbps
- Character length: 5, 6, 7, or 8 bits
- Parity: even, odd, none, mark, and space
- Stop bit: 1, 1.5 or 2
- I/O connectors: four 8-pin RJ45 connectors
- Interrupt levels: IRQ 3, 4, 5, 6, 7, 9, 10, 11, 12 or 15
- Clock input: 14.745 MHz
- Power consumption (+5 V): 245 mA
- MTBF: 100,000 hrs under 25°C environment
- Operating temperature: 0 to 55°C
- Storage temperature: -20 to 85°C
- Relative humidity: 5 to 95%, non-condensing
- Regulatory Approvals: FCC Class A, CE

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Hardware Installation

This chapter includes information about hardware installation for CA-104.

The following topics are covered:

- ❑ **Hardware Installation**
- ❑ **I/O Address & Interrupt Vector Settings**
- ❑ **IRQ Setting**
- ❑ **Initial Inspection**
- ❑ **RS-232 pin assignments**

Hardware Installation

The hardware installation of CA-104 serial boards is easy to carry out. Before you insert the card into the PC/104 interface, you must first configure I/O Base Address & Interrupt Vector, and IRQ Settings. Follow the detailed steps given below to install the CA-104 serial board in your computer.

Step 1: Configure I/O Base Address & Interrupt Vector, and IRQ Settings (see details below).

ATTENTION



Safety First!

To avoid damaging your system and boards, make sure your PC's power is turned off before installing your CA-104 board.

Step 2: Turn your PC's power off, and also shut off the power to any peripheral devices, and then remove the PC's cover.

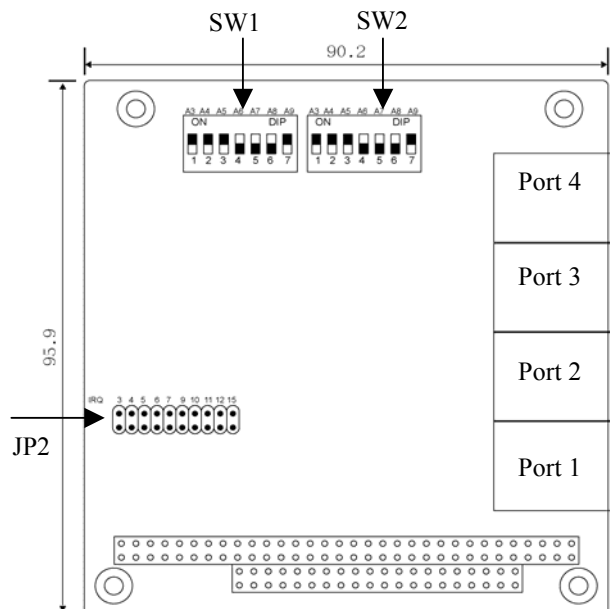
Step 3: Insert the CA-104 serial board into the PC/104 interface slot.

Step 4: Fasten the holding screw to fix the serial board in place.

Step 5: Replace the PC's cover.

Step 6: Power on the PC.

Block Diagram of CA-104



I/O Base Address & Interrupt Vector Settings

CA-104 Series has two 7-switch DIP switch panels, named SW1 and SW2. Panel SW1 is for I/O Base Address setting, and SW2 is for Interrupt Vector setting. Once you configure Port 1's I/O Base Address and Interrupt Vector, the settings for the other ports will be configured automatically as well. You can choose base addresses from Hex 000 to 3FF. The default settings are CH#1 (Hex 180) for I/O

Base Address, and 1C0 for Interrupt Vector settings.

Example:

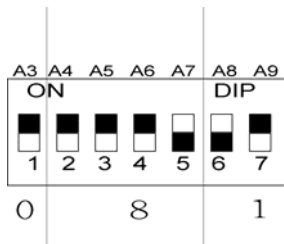
When you wish to configure your Port 1's I/O base address to 180, the DIP switch settings of panel SW1 should be as follows:

A3	A4	A5	A6	A7	A8	A9	Hex
On	On	On	On	Off	Off	On	0 × 180

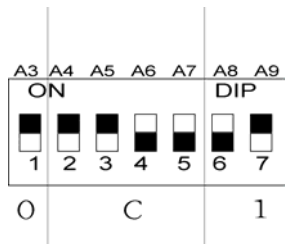
When you wish to configure your Port 1's INT Vector to 1C0, the DIP switch settings of panel SW2 should be as follows:

A3	A4	A5	A6	A7	A8	A9	Hex
On	On	On	Off	Off	Off	On	0 × 1C0

The following diagrams show the DIP switch settings of panel SW1 and panel SW2 when the I/O base address is configured to be 180, and when INT Vector is configured to be 1C0.



The diagram shown above is SW1 for setting I/O Base Address.



The diagram shown above is SW2 for setting INT Vector.

At this point, the start of I/O addresses of Port 2, Port 3, and Port 4 will be automatically configured at 188, 190, and 198.

A3	A4	A5	A6	A7	A8	A9	
8	1	2	4	8	1	2	Hex
On	On	On	On	On	On	On	0x000
On	On	On	On	On	On	Off	0x200
On	On	On	On	On	Off	Off	0x300
On	On	On	On	Off	Off	Off	0x380
On	On	On	Off	Off	Off	Off	0x3C0
On	On	Off	Off	Off	Off	Off	0x3E0
On	Off	Off	Off	Off	Off	On	0x3F0
Off	Off	Off	Off	Off	Off	Off	0x3F8
Off	On	On	On	On	On	On	0x008
Off	Off	On	On	On	On	On	0x018
Off	Off	Off	On	On	On	On	0x038
Off	Off	Off	Off	On	On	On	0x078
Off	Off	Off	Off	Off	On	On	0x0F8
Off	Off	Off	Off	Off	Off	On	0x2F8

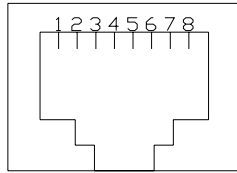
IRQ Setting

The IRQ settings of CA-104 are selectable by JP2 jumper. Before you insert a CA-104 board into the PC/104 interface, you need to choose an available jumper from 3, 4, 5, 6, 7, 9, 10, 11, 12, or 15 to configure the IRQ setting.

Initial Inspection

Before we ship CA-104 products, we first perform a careful mechanical and electrical inspection of the serial boards. Products should be free of any marks or scratches and in perfect electrical order when customers receive them. Handle these boards only by their edges, since the static charge from your body may damage the integrated circuits. Always keep the boards in their anti-static package whenever they are not installed. You can also use this package to return the board should it need to be repaired.

RS-232 Pin Assignment



PIN	SIGNAL
1	DSR
2	RTS
3	GND
4	TXD
5	RXD
6	DCD
7	CTS
8	DTR

Software Installation

After installing the CA-104 serial boards in your computer, the next step is the software installation. The driver for CA-104 supports various operating systems, including Windows NT, Windows 2000/XP/2003, Windows 95/98/Me, and DOS. This chapter includes information about how to install and remove the CA-104 driver.

The following topics are covered in this chapter:

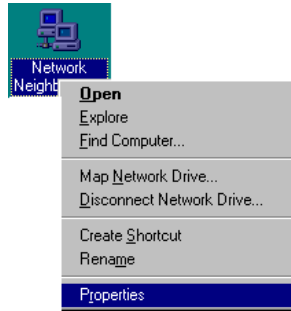
- ❑ **Windows NT**
- ❑ **Windows 2000/XP/2003**
- ❑ **Windows 95/98/Me**
- ❑ **DOS**

Windows NT

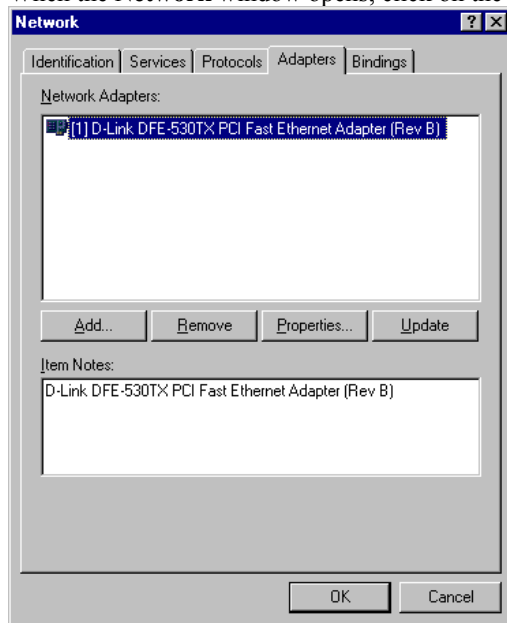
Installing the driver

The following procedure is for installing the CA-104 serial board driver under Windows NT 4.0.

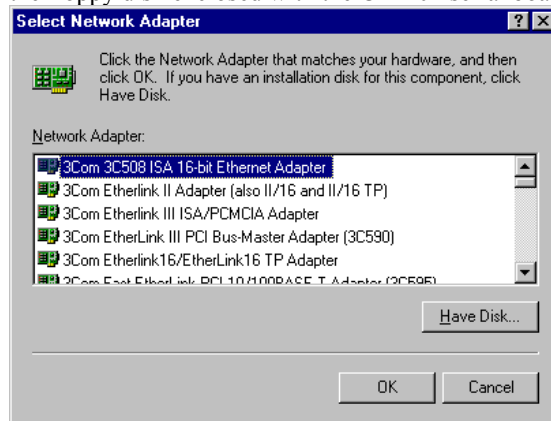
1. Use the mouse to position the cursor over your desktop's **Network** icon, and then click the right mouse button. Select **Properties** and then click the left mouse button.



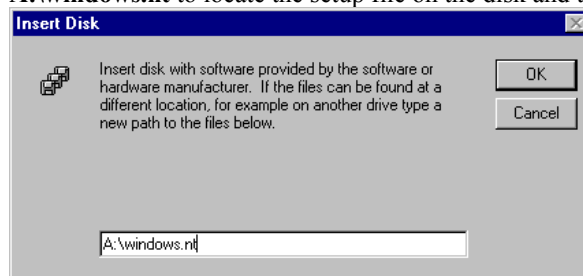
2. When the **Network** window opens, click on the **Adapters** tab and then click on **Add**.



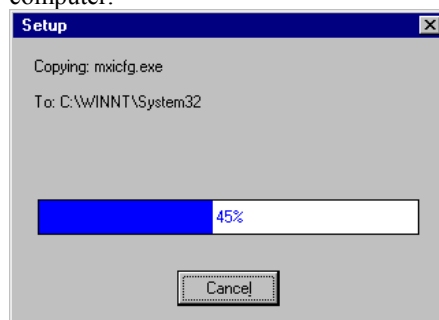
- When the **Select Network Adapter** window opens, click on **Have Disk** to install the driver from the floppy disk enclosed with the CA-104 serial board.



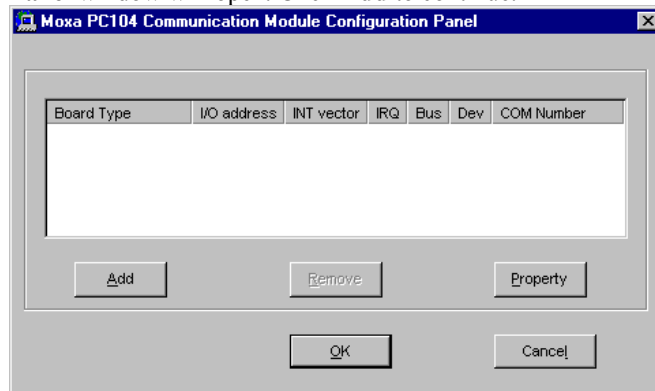
- The **Insert Disk** window will open asking you to insert the disk into your computer. Type **A:\windows.nt** to locate the setup file on the disk and then click **OK**.



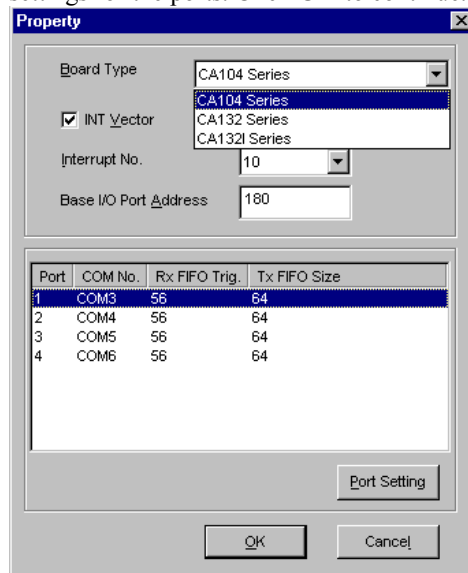
- The **Setup** window will open, showing that the computer is copying the setup file to your computer.



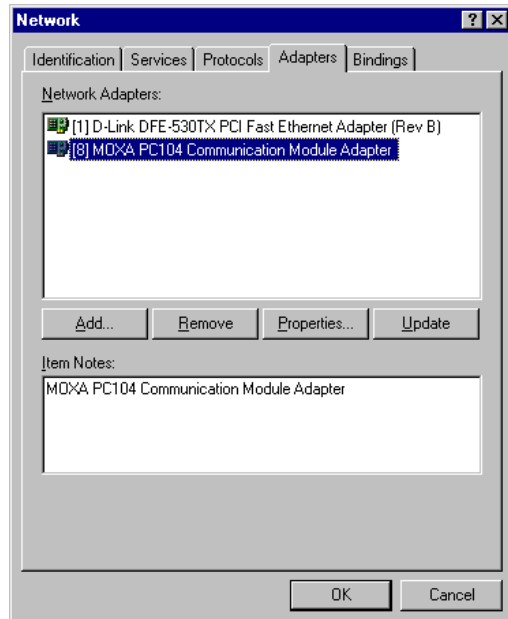
6. After the setup file has been copied, the **Moxa PC104 Communication Module Configuration Panel** window will open. Click **Add** to continue.



7. When the **Property** window opens, select **CA104 Series** under **Board Type**. The window will show the COM port number to which the serial ports of CA-104 are assigned, and the default settings for the ports. Click **OK** to continue.

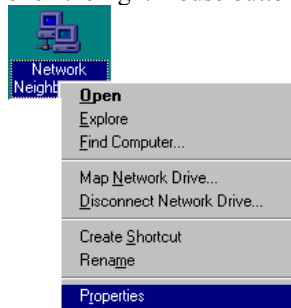


8. The **Network** window will open, showing the serial board you just added to your computer. Click **OK** to finish the installation.

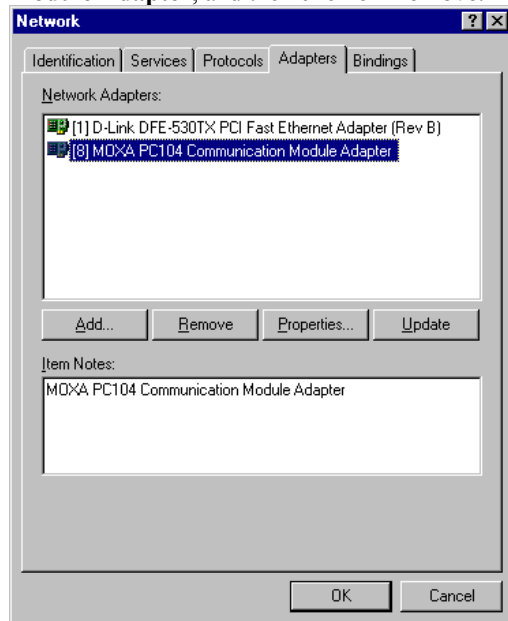


Removing a CA-104 serial board

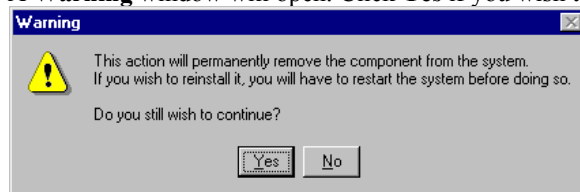
1. If you wish to remove a CA-104 serial board, move your mouse to your desktop's **Network** icon, click the right mouse button, and then select **Properties**.



2. When the **Network** window opens, choose **Adapters**, select **MOXA PC104 Communication Module Adapter**, and then click on **Remove**.



3. A **Warning** window will open. Click **Yes** if you wish to remove the CA-104 serial board.

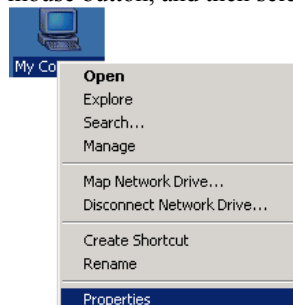


Windows 2000/XP/2003

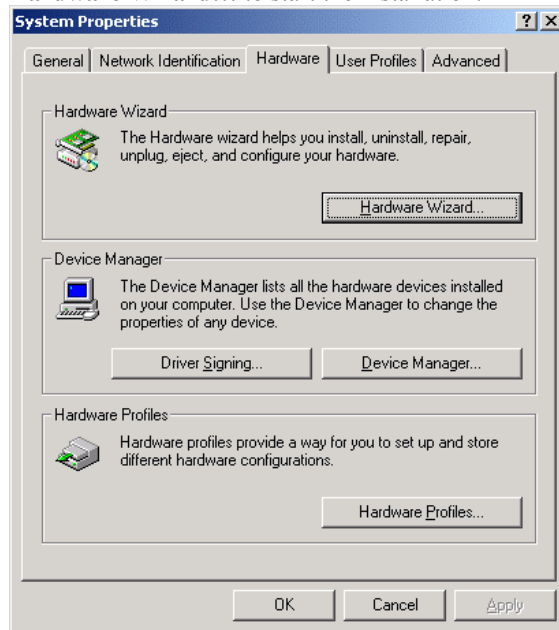
Installing the driver

The following procedure explains how to install the CA-104 serial board driver under Windows 2000/XP/2003.

1. Use your mouse to position the cursor over your desktop's **My Computer** icon, click the right mouse button, and then select **Properties**.



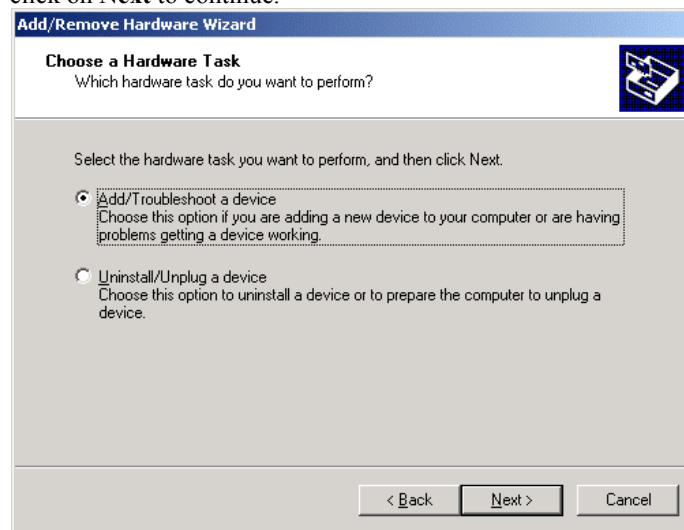
2. When the **System Properties** window opens, click on the **Hardware** tab, and then click on **Hardware Wizard...** to start the installation.



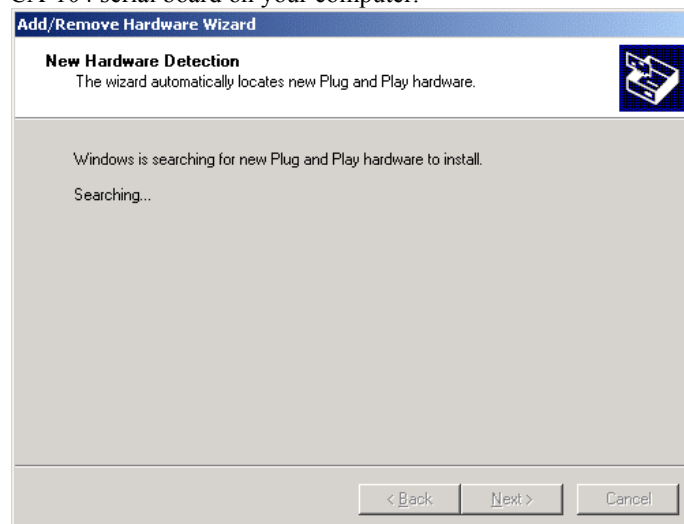
3. The **Add/Remove Hardware Wizard** window will open next. Click on **Next** to continue.



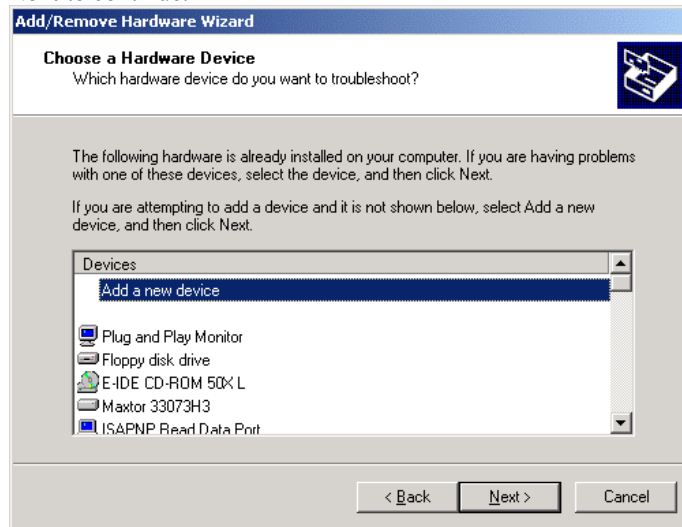
4. When the **Choose a Hardware Task** window opens, select **Add/Troubleshoot a device**, and then click on **Next** to continue.



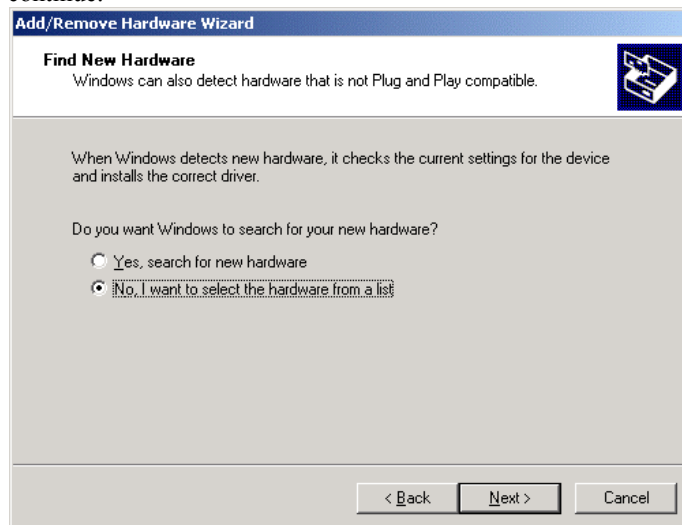
5. The **New Hardware Detection** window will open showing that the Wizard is searching for the CA-104 serial board on your computer.



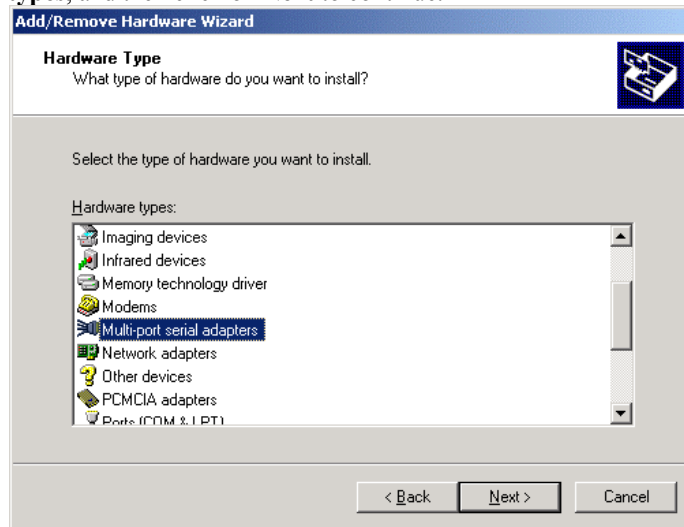
6. When the **Choose a Hardware Device** window opens, select **Add** a new device and then click **Next** to continue.



7. The **Find New Hardware** window will open next. Select **No, I want to select the hardware from a list**, since CA-104 is a brand new type of ISA serial board, and then click on **Next** to continue.



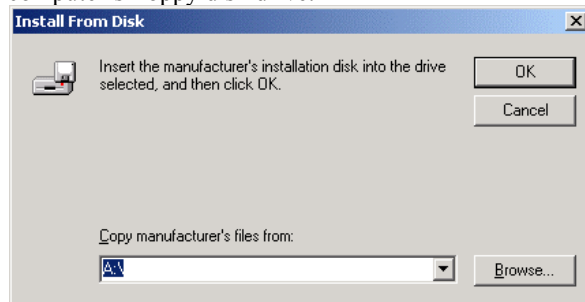
8. When the **Hardware Type** window opens, select **Multi-port serial adapters** under **Hardware types**, and then click on **Next** to continue.



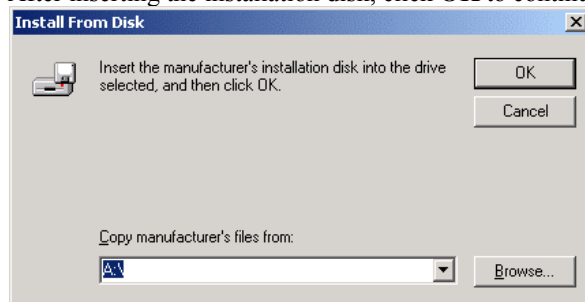
9. When the **Select a Device Driver** window opens, click on **Have Disk** to install the CA-104 driver from the floppy disk that came with the CA-104 serial board.



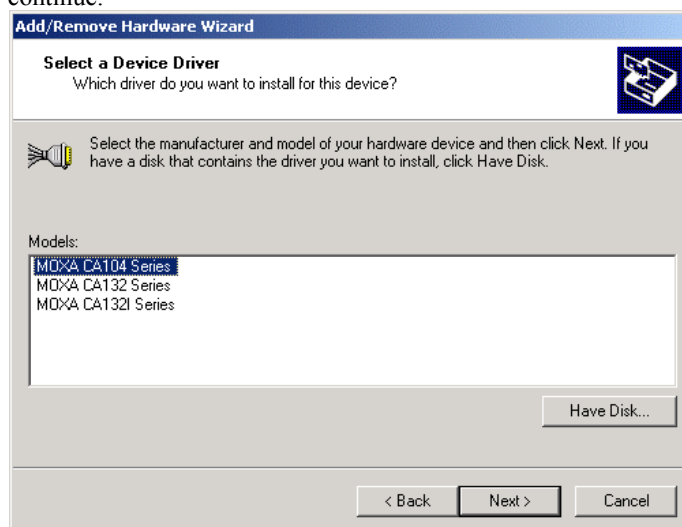
10. The **Install from Disk** window that opens will prompt you to insert the installation disk into your computer's floppy disk drive.



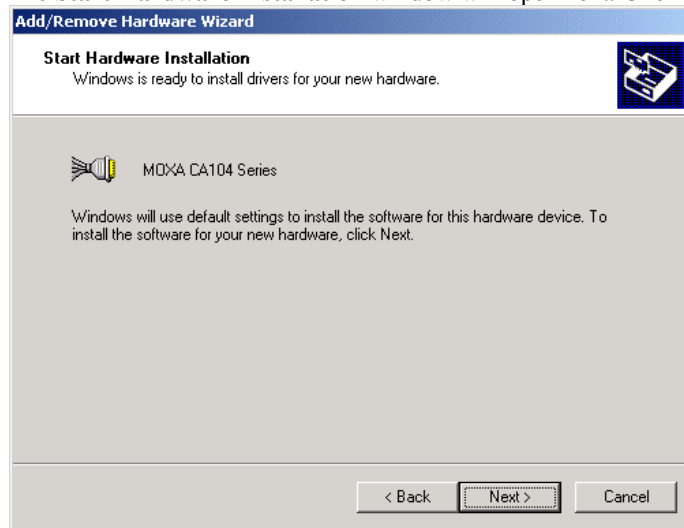
11. After inserting the installation disk, click **OK** to continue.



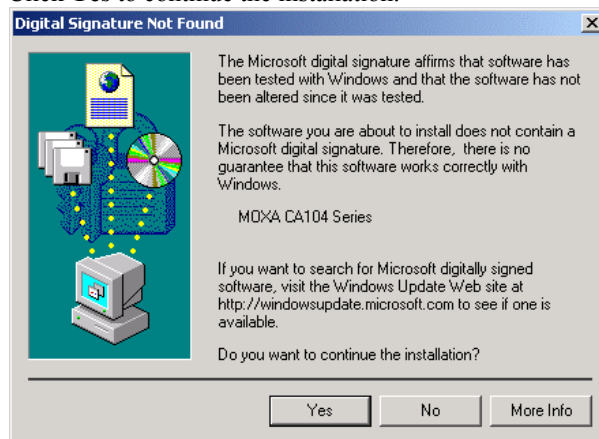
12. When the **Select a Device Driver** window opens, select **MOXA CA104 Series** and click Next to continue.



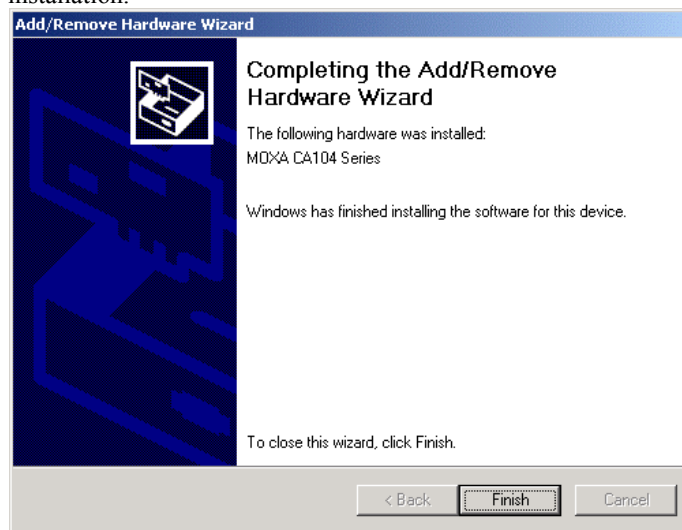
13. The **Start Hardware Installation** window will open next. Click on **Next** to continue.



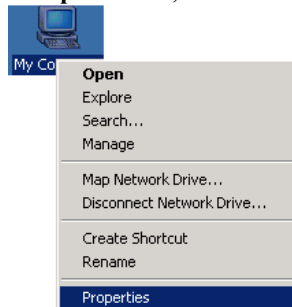
14. A **Digital Signature Not Found** window will open. Although this message states that the MOXA CA104 Series driver does not contain a Microsoft digital signature, you can rest assured, since the CA104 Series driver has already been tested and been shown that it can support Windows OS. Click **Yes** to continue the installation.



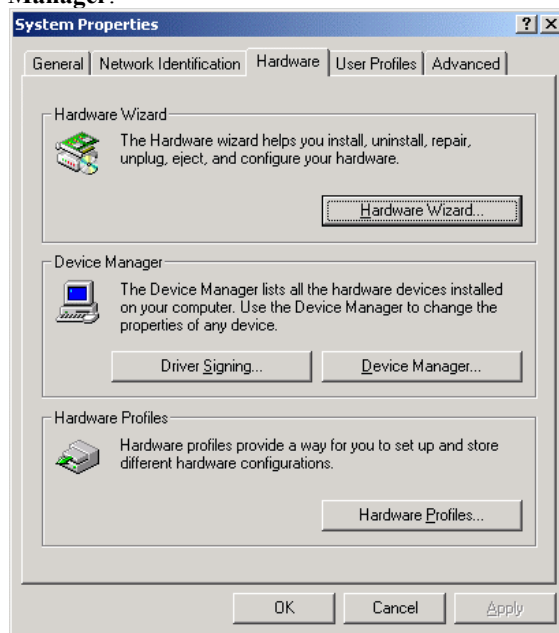
15. The next window to open states that the installation is completed. Click **Finish** to end the installation.



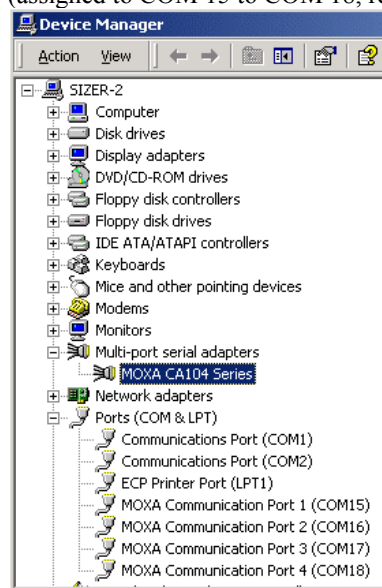
16. After the installation is completed, use your mouse to position the cursor over your desktop's **My Computer** icon, click the right mouse button, and then select **Properties**.



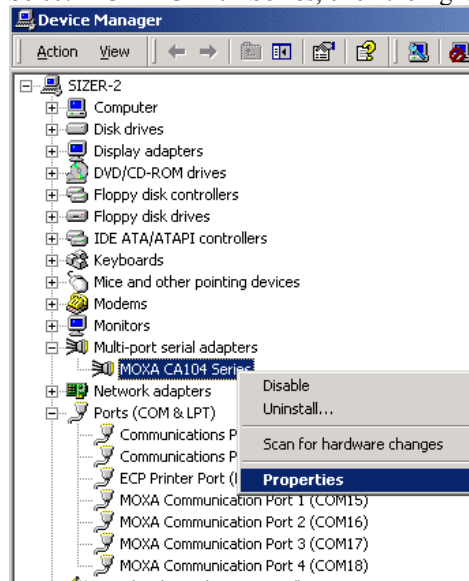
17. When the **System Properties** window opens, click on the **Hardware** tab, and then click on **Device Manager**.



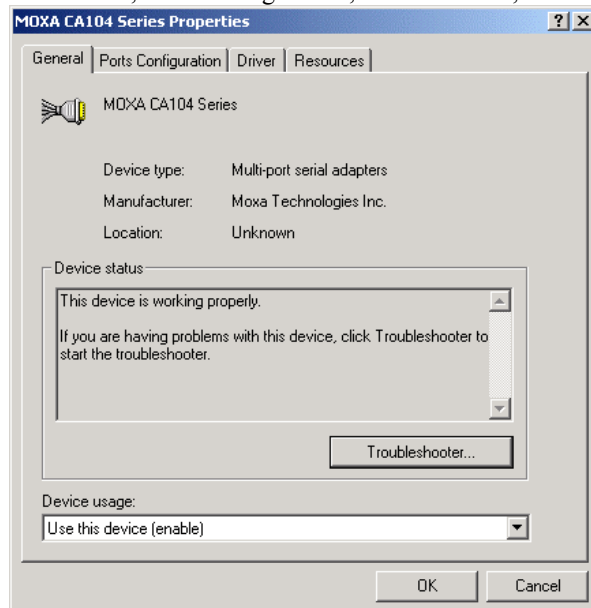
18. The **Device Manager** window will open next. At this point, you should be able to find **MOXA CA104 Series** under **Multi-port serial adapters**, and **MOXA communication Port 1 to Port 4** (assigned to COM 15 to COM 18, respectively) under **Ports (COM & LPT)**.



19. Select **MOXA CA104 Series**, click the right mouse button, and then select **Properties**.

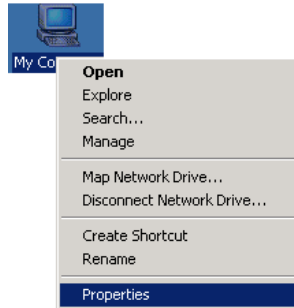


20. The **MOXA CA104 Series Properties** window will open, allowing you to view general information, Ports Configuration, Driver version, and Resource Settings.

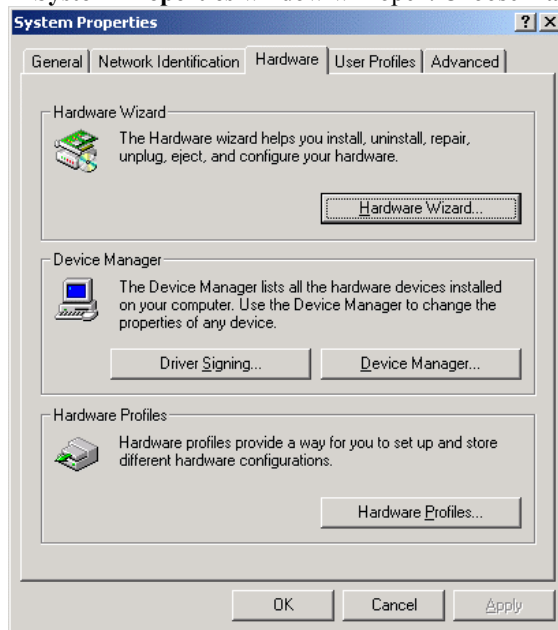


Disabling the device

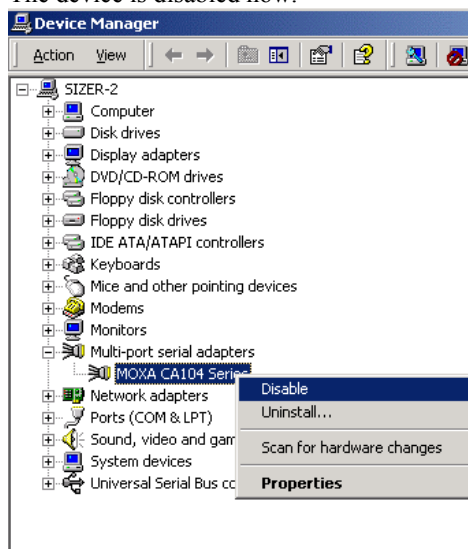
1. Use your mouse to position the cursor over your desktop's **My Computer** icon, click the right mouse button, and then select **Properties**.



2. A **System Properties** window will open. Choose **Hardware** and select **Device Manager**.

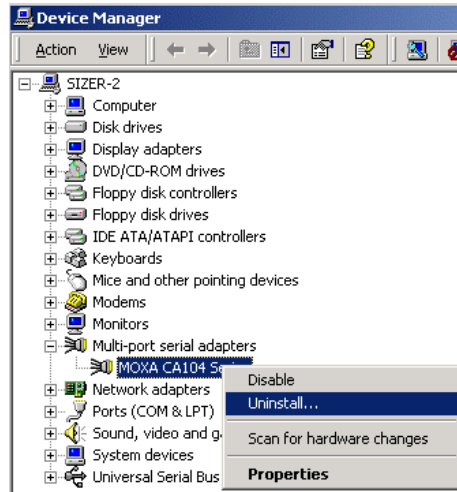


3. When the **Device Manager** window opens, select **MOXA CA104 Series** under **Multi-port serial adapters**, and then click the right mouse button. Select **Disable** and click the left mouse button. The device is disabled now.

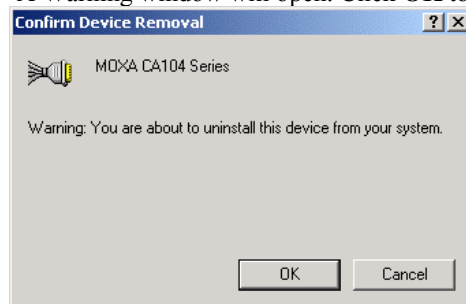


Uninstalling the device

1. Follow steps 1 and 2 of **Disabling the device**.
2. Select **MOXA CA104 Series** under **Multi-port serial adapters** and then click the right mouse button. Select **Uninstall** and click the left mouse button.



3. A Warning window will open. Click **OK** to uninstall the device.

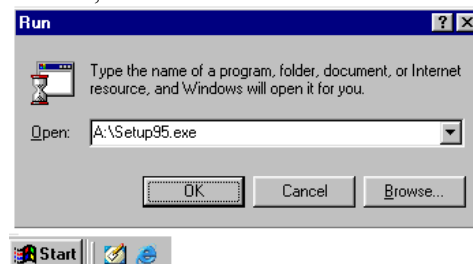


Windows 95/98/ME

Installing the driver

The following procedure is for installing the CA-104 serial board driver under Windows 95/98/ME.

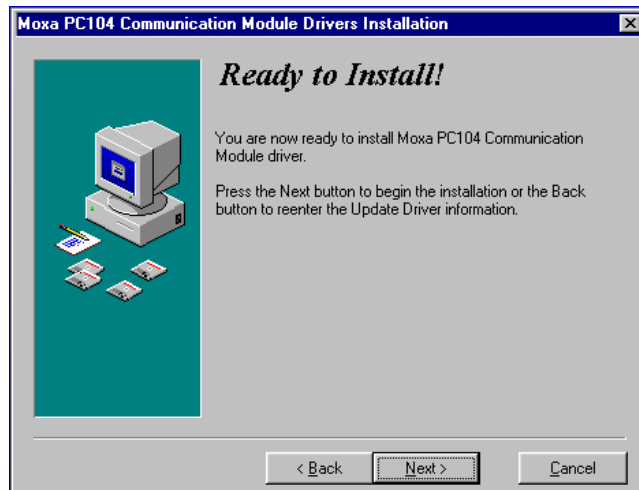
1. Insert the installation disk into your computer, and then click on **Run** under the **Start Menu**. Click on **Browse** to locate the setup file in the disk or directly type in the path if you already know it, and then click **OK** to continue.



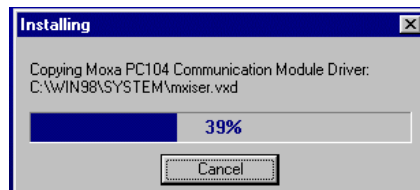
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2. A Welcome message will appear. Click **Next** to continue.



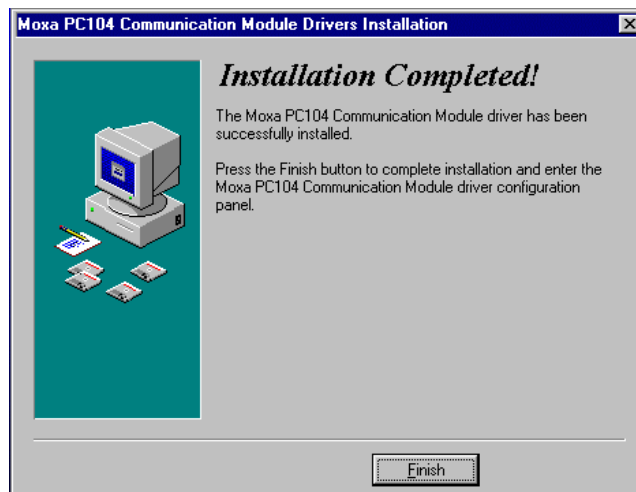
-
-
3. A window will open stating the computer is ready to install the driver. Click on **Next** to continue.



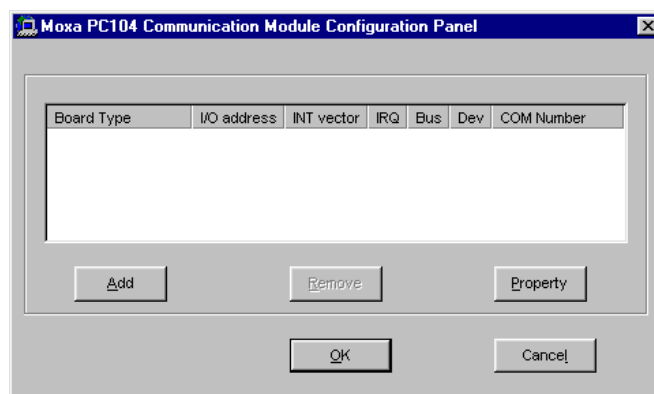
-
-
-
4. A message will appear showing that the setup file is being installed.



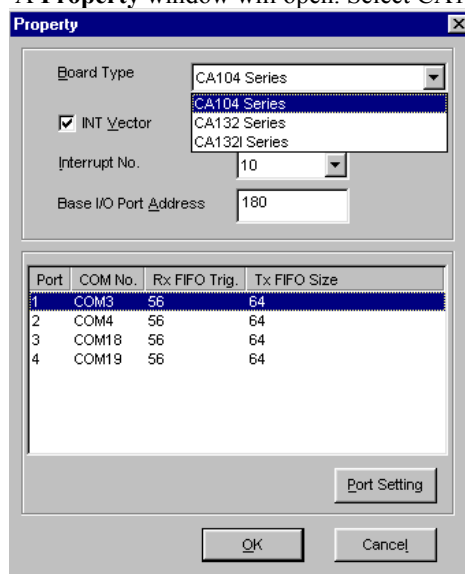
- A window will appear showing that the installation is completed. Click on **Finish** to end the installation.



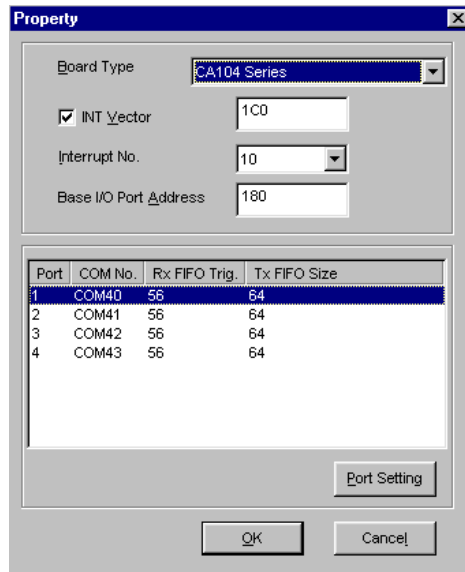
- The **Moxa PC104 Communication Module Configuration Panel** window will appear. Click on **Add** to add the CA-104 serial board to your computer.



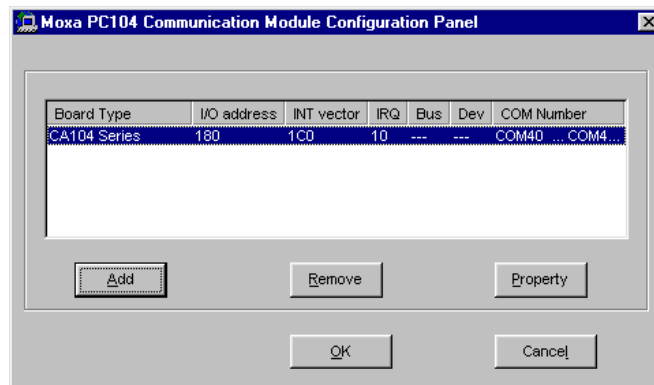
- A **Property** window will open. Select CA104 Series under **Board Type**.



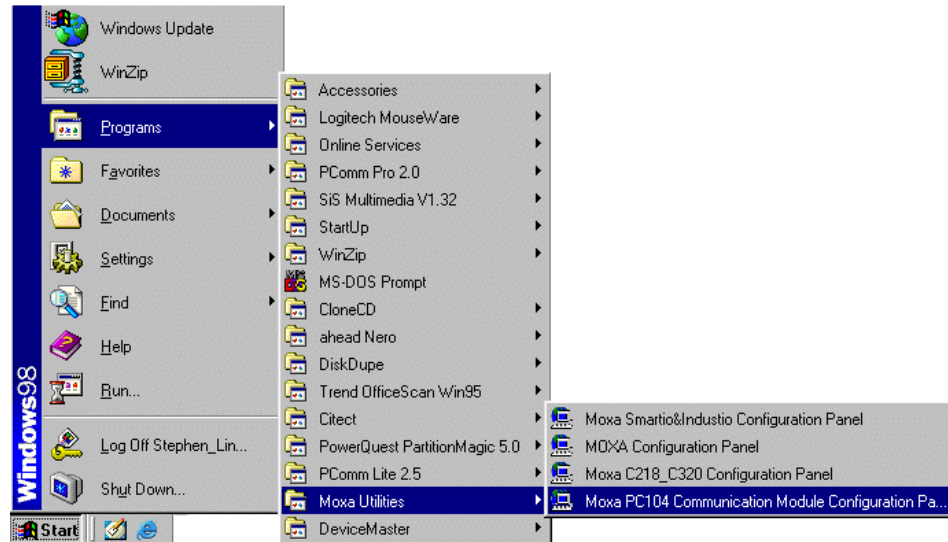
8. The **Property** window will show the COM port number to which the serial ports of CA-104 are assigned, and the default settings. Click **OK** to continue.



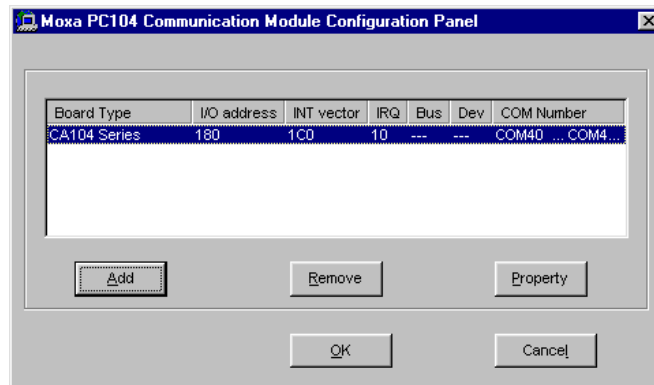
9. The **Moxa PC104 Communication Module Configuration Panel** window will show the CA-104 serial board you just added. Click **OK** to close the window.



10. If you want to open the **Moxa PC104 Communication Module Configuration Panel** window, click on **Start → Programs → Moxa Utilities → MOXA PC104 Communication Module Configuration Panel**.

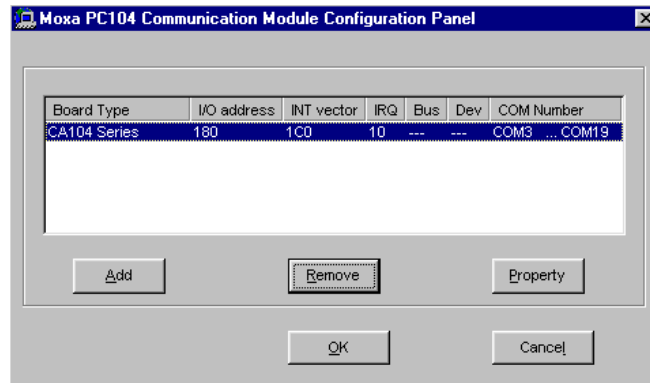


11. The **Moxa PC104 Communication Module Configuration Panel** window will open. You should be able to see the CA104 Series serial board you just added. Click on **Property** to see and configure the information and settings of the board's COM ports.

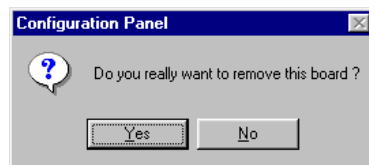


Removing the device

1. If you wish to remove the device, follow steps 11 and 12 of the **Installing the driver** section. Click on **Remove** when the **Moxa PC104 Communication Module Configuration Panel** opens.



2. A warning message will appear asking you if you really want to remove this board. Click on **Yes** to remove the CA-104 serial board.

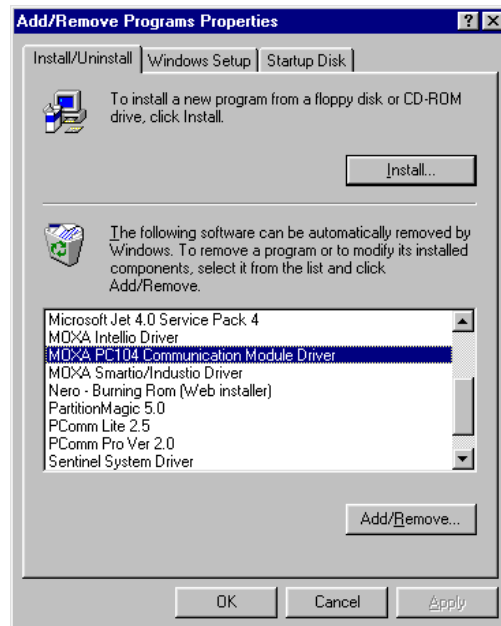


Uninstalling the driver

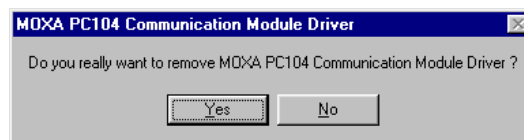
1. Click on **Start** → **Settings** → **Control Panel**.
2. Select **Add/Remove Programs**.



Choose **Install/Uninstall**, and select **MOXA PC104 Communication Module Driver**, and then click **Add/Remove** to uninstall the driver.



3. A message will appear asking you if you really want to remove the driver. Click **Yes** to uninstall the driver.



4. A message will appear confirming that the uninstallation of the driver is completed. Click **OK** to close the window.



DOS

MOXA DOS API-232 is a software package that assists users to develop and/or debug programs for serial communications. This section will show you how to install the package, how to setup up the driver, and how to load or unload driver.

For details of the serial programming (API-232 Library) and utilities, please refer to the next chapter, "Serial Programming Tools".

Installing Driver

Run the installation program, **DOSINST.EXE**, in the DOS folder. Specify the target API-232 directory (e.g. **C:\MOXA**) where software driver will be copied. Press **F2** to start the installation.



After installation is complete, you will be prompted to proceed running setup program. It is strongly recommended to do so.



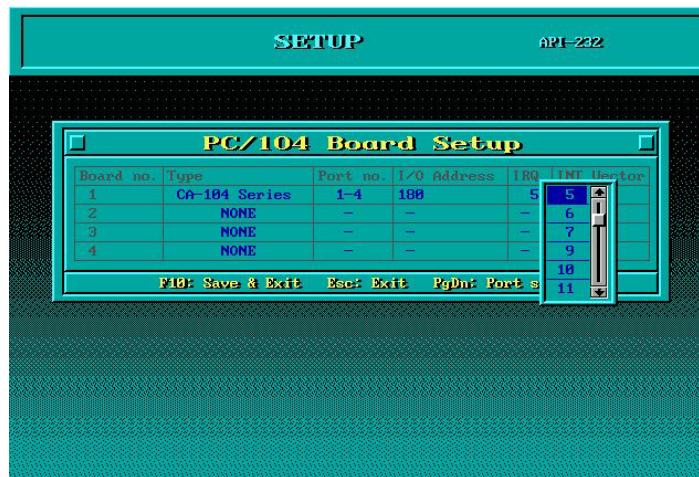
Driver Setup

The following are steps for setting up the CA-104 Series driver. Note that it is not intended to illustrate all the convenient functions of the setup programs when configuring the boards. Please refer to the F1 on-line help instructions as running setup program.

1. Run the setup program, **BIN\SETUP.EXE**.
2. Please press **Enter** to select the proper model name, CA-104 Series.



3. You have to configure the Port No., I/O Address, IRQ and INT Vector properly. These settings **MUST** match up the hardware configuration of CA-104 Series.



4. You may press **PgDn** key to have advanced “Port setup”. Now the configuration of the desired CA-104 Series board will be shown along with other default settings, such as port number, buffer size, etc.

Note ! Up to now you have completed the setup for **CA-104** Series board. You may skip this step and go directly to the next **step 4** if you need not change any setting or configure any board.

You may now enter/modify each port’s configuration. These displayed values are the port initial values as driver is loaded.

	01	02	03	04	---	---	---	---
Port Number	01	02	03	04	---	---	---	---
TxD buffer size	1K	1K	1K	1K	---	---	---	---
RxD buffer size	1K	1K	1K	1K	---	---	---	---
Baud rate	9600	9600	9600	9600	---	---	---	---
Character length	8	8	8	8	---	---	---	---
Stop bits	1	1	1	1	---	---	---	---
Parity	None	None	None	None	---	---	---	---
DTR output state	On	On	On	On	---	---	---	---
RTS output state	On	On	On	On	---	---	---	---
CTS flow control	No	No	No	No	---	---	---	---
RTS flow control	No	No	No	No	---	---	---	---
Tx NOM/OFF ctrl	No	No	No	No	---	---	---	---
Rx NOM/OFF ctrl	No	No	No	No	---	---	---	---

F1: Help F5: Group edit F10: Save Esc: Abort

Legend: Some noticeable fields and functions are explained below.

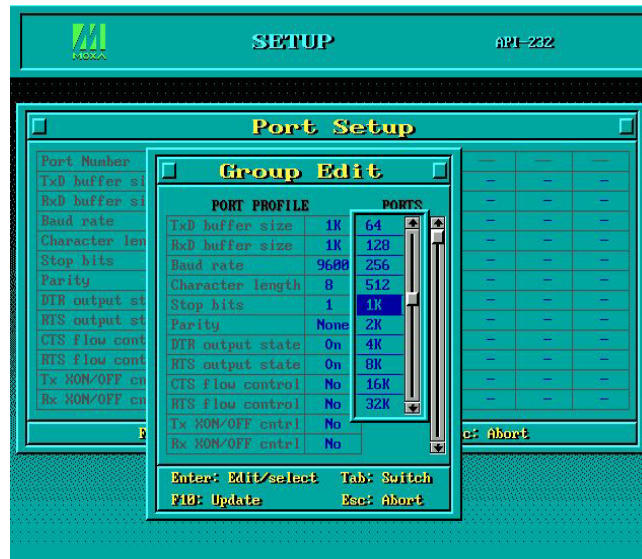
Port number: This is actually the port ID of each port. The application software will refer to the port by its port number (ID). Duplicated port number is not allowed. That is, each MOXA serial port is referred to as port number in terms of serial programming.

You may map the port number range to the one you prefer between 0 and 127 as long as no port number overlapping condition or port number undefined condition occurs. Generally, you should take the convenience of programming into consideration when specifying the port numbers for the board.

TxD buffer size: The transmission (output) buffer allocated in the system for each port.

RxD buffer size: The receiving (input) buffer allocated in the system for each port.

F5: Group Edit: This is a convenient function that helps you edit the configuration of several ports at one time as a group.



5. Press **F10** to save the latest configuration and exit the SETUP program.

Loading Driver

Having completed the setup, you can load the driver, "**BINDPC-DRV.EXE**", at the DOS prompt. The driver will detect the **CA-104** Series board automatically. If the board(s) is(are) detected, a message similar to below will show:

```
PC/104 Communication Module DOS driver Version 1.0
Setup driver ...
CA-104 series OK!
Device driver setup O.K.
```

It means the **CA-104** Series driver is installed properly. At this point, you are ready to execute application that supports API-232 functions, or start developing applications using API-232 library.

Unloading Driver

To unload (release) the **CA-104** Series driver from memory, type "**DPC-DRV/Q**" at the DOS prompt.

Serial Programming Tool

Moxa supports a class of easy to use, yet powerful serial programming libraries and communication troubleshooting utilities under Windows NT/2000/XP and Windows 95/98. Use these MOXA Serial Programming Tools to decrease your software development time.

In the following sections, we describe the installation of the library, and the utilities supported for various programming platforms.

PComm, a professional serial comm tool for PCs, is a software package that runs under Windows NT/2000/XP and Windows 95/98. *PComm* provides:

- A powerful serial communication library for easy programming in the most popular programming languages. The serial communication library is useful for developing applications for data communications, remote access, data acquisition, and industrial control under Windows NT/2000/XP or Windows 95/98. It is a simpler solution compared to the more complex Windows Win32 COMM API.
- Useful utilities such as diagnostic, monitor, and terminal emulator.
- Illustrative sample programs,
- Comprehensive on-line documentation.

The following topics are covered in this chapter:

- ❑ **PComm Installation**
- ❑ **PComm Programming Library**
- ❑ **Utilities**

PComm Installation

To install *PComm*, run \Setup.exe from the diskette enclosed in the package. Please note that the *PComm* diagnostic and monitor utilities are for MOXA boards only; these two utilities will not work with other manufacturer's serial boards.

PComm Programming Library

The serial communication library assists you in developing serial communications programs for any COM port that complies with Microsoft Win32 API. It facilitates the implementation of multi-process and multi-thread serial communication programs and hence remarkably reduces development time.

This serial communication library provides a complete function library and sample programs for Visual C++, Visual Basic, and Delphi. To view detailed function descriptions and sample programs, click on [Start] → [Program] → [*PComm Lite*] → [*PComm Lib Help*], [*PComm Porting Notes*] or [*PComm Programming Guide*], or refer to the sample programs in the *PComm* directory.

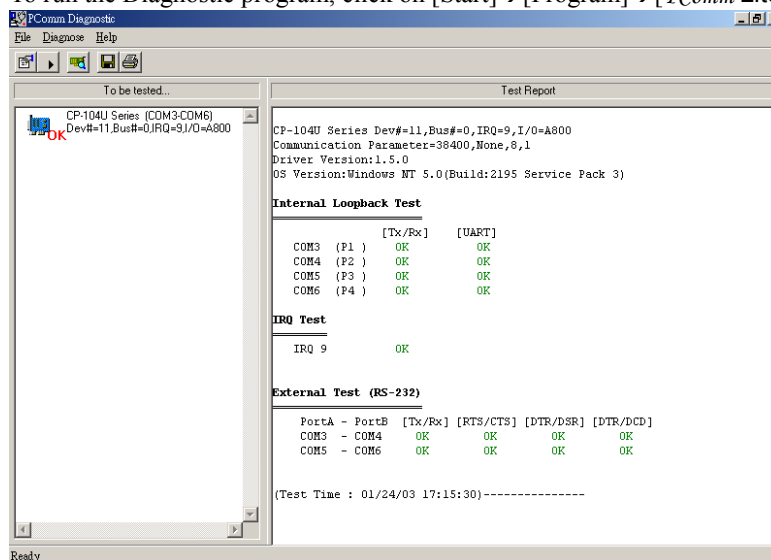
Utilities

In this section, we give brief descriptions of each utility. For more information about these utilities, see the on-line help from the software diskette.

Diagnostic (for MOXA boards only)

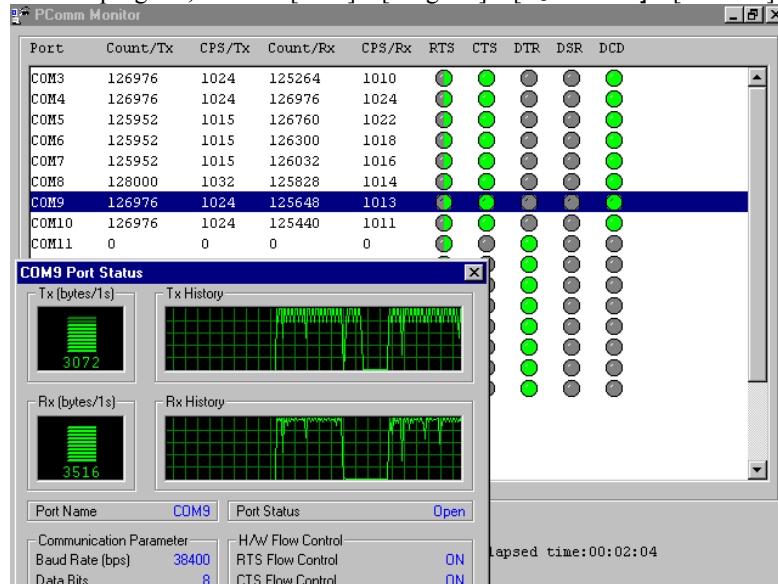
A convenient diagnostic program, ONLY for MOXA boards and ports, provides internal and external testing of IRQ, TxD/RxD, UART, CTS/RTS, DTR/DSR, DTR/DCD, etc. It allows the user to check the function of both software and hardware.

To run the Diagnostic program, click on [Start]→[Program]→[*PComm Lite*]→[Diagnostic].



Monitor (for MOXA boards under Windows NT Only)

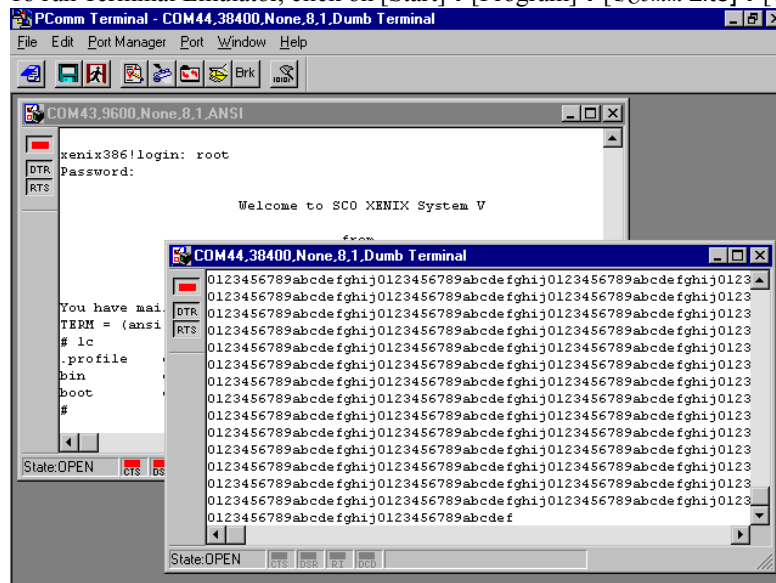
A useful port status monitoring program allows you to monitor data transmission of selected MOXA COM ports. It monitors data transmission/receiving throughput, and communication line status, with data updated and displayed on the screen at regular time intervals. Click on a specific port to see a graph of the current communication parameters and status of that port. To run the Monitor program, click on [Start]→[Program]→[*PCComm Lite*]→[Monitor].



Terminal Emulator

Terminal Emulator can be used to connect to various ports to see if data transmission is functioning correctly. Terminal Emulator features multi-windows, and supports VT100 and ANSI terminal types. You can transfer data interactively, send patterns periodically, and transfer files using ASCII, XMODEM, YMODEM, ZMODEM, and KERMIT protocols.

To run Terminal Emulator, click on [Start]→[Program]→[PComm Lite]→[Terminal Emulator].



For more information on these functions, please refer to the *PComm* library on-line Help file for Windows NT and Windows 95/98 or API-232.txt file for DOS, respectively.

A

Service Information

This appendix shows you how to contact Moxa for information about this and other products, and how to report problems.

In this appendix, we cover the following topics.

- ❑ **MOXA Internet Services**
- ❑ **Problem Report Form**
- ❑ **Product Return Procedure**

MOXA Internet Services

Customer satisfaction is our number one concern, and to ensure that customers receive the full benefit of our products, Moxa Internet Services has been set up to provide technical support, driver updates, product information, and user's manual updates.

The following services are provided

E-mail for technical support support@moxa.com.tw

World Wide Web (WWW) Site for product information:

..... <http://www.moxa.com>

Problem Report Form

MOXA CA-104 Series

Customer name:	
Company:	
Tel:	Fax:
Email:	Date:

1. **Moxa Product:** ☐ CA-104

2. **Serial Number:** _____

Problem Description: Please describe the symptoms of the problem as clearly as possible, including any error messages you see. A clearly written description of the problem will allow us to reproduce the symptoms, and expedite the repair of your product.

Product Return Procedure

For product repair, exchange, or refund, the customer must:

- ◆ Provide evidence of original purchase.
- ◆ Obtain a Product Return Agreement (PRA) from the sales representative or dealer.
- ◆ Fill out the Problem Report Form (PRF). Include as much detail as possible for a shorter product repair time.
- ◆ Carefully pack the product in an anti-static package, and send it, pre-paid, to the dealer. The PRA should be visible on the outside of the package, and include a description of the problem, along with the return address and telephone number of a technical contact.